REMARKS/ARGUMENTS

Favorable reconsideration of the present application is respectfully requested.

Applicants wish to thank Examiner Broadhead for the courtesy of an interview on February 20, 2007 at which time the outstanding Office Action and possible amendments to the claims were discussed. The claims have herein been amended to clarify that it is "values of" a physical quantity that are being calculated. It is Applicant's understanding from the interview that amendments as set forth in the present response will overcome the objections of paragraphs 8, 11, 16 and 17 of the Office Action.

As to paragraph 2, it is noted that alternative limitations are permissible so long as they do not result in ambiguities. There is no evidence of such ambiguity in the present claims. For example, Claim 11 clearly recites that the steering angle is controlled so as to be the same for the right and left wheels. Since it is clear that this is the case when the steering angle is controlled, the alternative recitation in Claim 1 does not introduce any ambiguity therein. Accordingly, the embodiments have not been separately claimed.

As to paragraph 7 and 10 of the Office Action, the Examiner explained during the interview that he could not understand how equation 9 could determine the resultant force because "F" in equation 9 is a calculated value (i.e., the critical friction circle) and not a measured value. In reply, Applicants note that the resultant force is in fact determined by equation 11 with reference to the constraints of equations 9-10 (page 13, lines 11-15). That is, the resultant force is represented by a maximum value of equation 11, as $q_1 - q_4$ according to equations 9 and 10 are varied. This explanation is believed to respond to the objections of these paragraphs.

Concerning paragraph 14, the meaning of the "secondary performance function" was questioned. In reply, Applicants note that the secondary performance function is used in order to calculate the resultant force, in other words, in order to determine angle q_i when the

value of equation 11 is maximized. The secondary performance function is represented by equations 14 and 15. Using the relationship $\cos X=1-X^2/2$, equation 11 approximates equation 14. Equation 14 is represented as follows:

$J=(F_1+F_2+F_3+F_4)-K/2$ (K satisfies equation 15)

Determining angle q_i when J is maximized is as same as determining angle q_i when K is minimized. In this embodiment, in order to simplify calculation, angle q_i, is determined from equation 15, and the resultant force is calculated using equation 11 and the determined angle q_i.

Accordingly, if the secondary performance function can determine angle q_i, it does not matter whether the secondary performance function represents the resultant force itself as in equation 15, or not as in equation 14.

Claims 1-3, 8, 11, 14-16, 21 and 24 were rejected under 35 U.S.C. §103 as being obvious over Awnar in view of U.S. patent publication 2002/0109402 (Nakamura). According to the Office Action, Awnar does not disclose controlling both braking force and driving force or maximizing a grip margin of each wheel, but that this would have been obvious in view of paragraphs 4, 14, 20, 167 and 219 of Nakamura. This rejection is traversed for the reasons set forth in the interview and discussed below.

That is, the prior art fails to teach cooperation of driving and braking, or cooperation of steering, driving and braking, in the control of the wheels of a vehicle. For example, a fixed value of the steering angle is conventionally outputted as a target value regardless of braking or driving. However, in an actual vehicle, critical friction is generated between a wheel and a road surface, and lateral force may be decreased by increasing braking force (page 2, lines 1-15).

Applicants have recognized that cooperation between steering, braking and driving is indispensable in order to use the friction force between the wheel and the road surface as

efficiently as possible (see paragraph bridging pages 20-21). Claims 1 and 14 therefore respectively recite a vehicle control method and apparatus including a step or means of controlling (A) the braking force and driving force of each wheel based on a first control variable, or controlling (A) the braking force and driving force of each wheel and (B) the steering angle of each wheel based on the first and second control variables.

Awnar discloses a yaw stability control system based on a linearized vehicle model and a predictive control algorithm.

> The control algorithm compares the vehicle yaw rate (measured from, for example, a production grade yaw rate sensor) with a desired yaw rate, which may be computed based on the vehicle speed and the steering wheel angle. If the yaw rate error, defined as the difference between the desired and measured yaw rates, exceeds a certain threshold, a controlling yaw moment is calculated based on the predictive control algorithm. This controlling yaw moment, or yaw torque, command is then translated into one or more actuator commands. For example, the control yaw moment may be produced by braking one or more of the vehicle's wheels. (Col. 1, lines 25-39).

Awnar thus teaches braking to control the vehicle yaw rate, but not driving or steering, i.e., it does not teach "controlling (A) the braking force *and driving force* of each wheel based on a first control variable, or controlling (A) the braking force *and driving force* of each wheel *and (B) the steering angle* of each wheel."

As for equations 31-34 of Awnar, they simply relate to a control torque T to be applied to the wheels is calculated based on a control yaw moment M_Z and a desired yaw rate R. There is no description of controlling the braking or driving torque according to a control variable which is calculated based upon a physical quantity for substantially uniformly maximizing the grip margin of each wheel.

As the Office Action has recognized, Awnar does not disclose the claimed feature of controlling both braking force and driving force or maximizing a grip margin of each wheel. Moreover, Nakamura cannot overcome this and the other shortcomings of Anwar. Nakamura discloses maximizing the friction coefficient of each wheel (paragraph [0167]),

and not maximizing the grip margin of each wheel – which involves minimizing the effective road friction by cooperative control (page 28, lines 10-14). Thus Nakamura cannot suggest modifying Awnar to maximize the grip *margin* of each wheel.

Applicants therefore believe that the present application is in a condition for allowance and respectfully solicit an early notice of allowability.

Respectfully submitted,

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